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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/722,319	11/24/2003	Hong-Gun Kim	5649-1182	9100

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EXAMINER

GOUDREAU, GEORGE A

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/722,319

Applicant(s)

KIM ET AL.

Examiner

George A. Goudreau

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 17-36 is/are rejected.
- 7) ☒ Claim(s) 16 and 37 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

George Goudreau
GEORGE GOUDREAU
PRIMARY EXAMINER

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 3-6, 8-14, 22-23, and 25-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Shih et. al. (2004/0038493).

Shih et. al. disclose a process for forming a STI structure on the surface of a wafer which is comprised of the following steps:

-STI trenches are etched into the surface of a Si wafer to form recesses (208), which are defined by stepped portions.;

-The surface of the wafer, and the STI trenches are planarized using an SOG layer (210).;

-The SOG layer is baked at a low temperature (i.e.-a temperature below 400 C.);

-The SOG layer may be optionally cmp planarized.;

-The SOG layer is etched back using a solution comprised of BOE (i.e.-H2O-NH4F-HF).;

-The etched back SOG layer is then cured by baking the wafer at a temperature of (750-1000) C.;

-An additional insulating layer such as HDPCVD SiO2 is formed onto the exposed surface of the wafer.;

- The surface of the HDPCVD SiO₂ is then cmp planarized.; and

- The oxide layers on the wafer are thermally annealed.

This is discussed on pages 1-3. This is shown in figures 1-2.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 2, 7, 15, 17-21, 24, and 31-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shih et. al. as applied in paragraph 2 above.

- the specific usage of a solution of polysilazane to form the SOG layer in the process taught above;

- the specific soft baking process parameters, which are claimed by the applicant;

- the specific removal of the Si₃N₄ pad/ SiO₂ pad layers after the STI structure has been formed; and

-the cmp planarization of the HDCVD SiO₂ layer after the Si₃N₄ pad, and SiO₂ pad layers have been removed from the surface of the wafer

It would have been obvious to one skilled in the art to employ a polysilazane solution in the formation of the SOG layer in the process taught above based upon the following. The usage of a polysilazane solution to form a SOG layer on a wafer is conventional or at least well known in the semiconductor processing arts. (The examiner takes official notice in this regard.) Further, this simply represents the usage of an alternative, and at least equivalent means for forming the SOG layer in the process taught above to the specific means, which are taught above.

It would have been obvious to one skilled in the art to remove the pad SiO₂ layer, and the pad Si₃N₄ layers in the process taught above after forming the STI structures in the process taught above based upon the following. The removal of pad Si₃N₄, and pad SiO₂ layers after using the layers to form an STI structure on a semiconductor wafer is conventional or at least well known in the semiconductor processing arts. (The examiner takes official notice in this regard.) Further, this simply represents the usage of an alternative, and at least equivalent means for forming the STI structure in the process taught above to the specific means, which are taught above.

It would have been obvious to one skilled in the art to cmp planarize the SiO₂ layer used to planarize the STI structure in the process taught above after the pad SiO₂ layer, and pad Si₃N₄ layer are removed in the process taught above based upon the following. It would have been desirable to further planarize the surface of the wafer

after removing the pad SiO₂, and pad Si₃N₄ layers in the process taught above to facilitate further processing of the wafer surface in the process taught above.

It would have been prima facie obvious to one skilled in the art to employ any of a variety of different process parameters during the soft baking process in the process taught above including those which are specifically claimed by the applicant. These are all well known variables in the soft baking art, which are known to effect both the rate and the quality of the soft baking process. Further, the selection of particular values for these variables would not necessitate any undue experimentation, which would have been indicative of unexpected results.

Alternatively, it would have been obvious to one skilled in the art to employ the specific soft baking process parameters which are claimed by the applicant in the process taught above based upon *In re Aller* as cited below.

"Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F. 2d 454, 105 USPQ 233, 235 (CCPA).

Further, all of the specific process parameters which are claimed by the applicant are results effective variables whose values are known to effect both the rate, and the quality of the soft baking process.

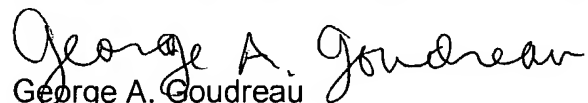
6. Claims 16, and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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8. Any inquiry concerning this communication should be directed to examiner

George A. Goudreau at telephone number (571)-272-1434.

A handwritten signature in cursive script that reads "George A. Goudreau". The signature is written in dark ink and is positioned above the printed name.

George A. Goudreau

Primary Examiner

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